Appendix A Updated project description

A.1 Proposal Summary table

The key features of the Proposal are summarised in Table A-1 below. The component specifications are subject to change. Where required, upper limit quantities and power level estimates are provided to ensure the assessment and any subsequent approval maintains the flexibility required in the detailed design in the Engineering Procurement and Construction (EPC) stage.

Table A-1 Summary of key features of the proposal (with modification updates in red)

Proposal element	Description
Proposal	Wollar Solar Farm.
Proponent	Wollar Solar Development Pty Ltd. (WSD).
Capacity	Approximately 290MW (AC).
Proposal site area	Approximately 878ha.
Development footprint area	Approximately 463ha.

Proposal element	Description

Site description – Project site

Lot	Deposited Plan	Lot	Deposited Plan
1	650653	76	755430
22	755430	77	755430
23	755430	78	755430
24	755430	79	755430
25	755430	80	755430
27	755430	84	755430
30	755430	92	755430
45	755430	105	755430
46	755430	106	755430
49	755430	107	755430
50	755430	119	755430
51	755430	152	755430
60	755430	153	755430
61	755430	154	755430
62	755430	1	1090027
63	755430	2	1090027
69	755430	4	1090027
70	755430	6	1090027
71	755430	7	1090027
72	755430	8	1090027
73	755430	10	1090027
74	755430	11	1090027
75	755430	7303	1139558

<table>
<tr><th>Proposal element</th><th>Description</th></tr>
<tr><td colspan="2">Site description – Barigan Road
<table>
<tr><th>Lot</th><th>Deposited Plan</th><th>Lot</th><th>Deposited Plan</th></tr>
<tr><td>6</td><td>131083</td><td>34</td><td>755455</td></tr>
<tr><td>8</td><td>131083</td><td>35</td><td>755455</td></tr>
<tr><td>11</td><td>131083</td><td>40</td><td>755455</td></tr>
<tr><td>13</td><td>131083</td><td>41</td><td>755455</td></tr>
<tr><td>31</td><td>755430</td><td>62</td><td>755455</td></tr>
<tr><td>33</td><td>755430</td><td>65</td><td>755455</td></tr>
<tr><td>34</td><td>755430</td><td>87</td><td>755455</td></tr>
<tr><td>41</td><td>755430</td><td>131</td><td>755455</td></tr>
<tr><td>84</td><td>755430</td><td>136</td><td>755455</td></tr>
<tr><td>134</td><td>755430</td><td>61A</td><td>755455</td></tr>
<tr><td>137</td><td>755430</td><td>7006</td><td>1024130</td></tr>
<tr><td>29</td><td>755455</td><td>7001</td><td>1055786</td></tr>
<tr><td>30</td><td>755455</td><td>9</td><td>1090027</td></tr>
<tr><td>31</td><td>755455</td><td>11</td><td>1090027</td></tr>
<tr><td>32</td><td>755455</td><td>7011</td><td>1116440</td></tr>
<tr><td>33</td><td>755455</td><td>-</td><td>-</td></tr>
</table>
The project site will also be taken to include any Crown land and road reserves contained within the project site.</td></tr>
<tr><td>Local Government</td><td>Mid-Western Regional Council.</td></tr>
<tr><td>Subdivision</td><td>Not intended.</td></tr>
<tr><td>Solar array</td><td>Number of panels: up to approximately 800,000.
Area of panels: up to 2,508,435m^2
Row spacing: approximately 7.5m.
Height: approximately 5m.</td></tr>
<tr><td>Substation</td><td>Approximately 6ha.
330kV outdoor substation.
2 x 330/33kV transformers.</td></tr>
<tr><td>Battery storage</td><td>Located within the north western portion of the site with the substation and laydown area.
With an electricity storage capacity of up to 30 MWh (i.e. 30 MW power output for one hour) and comprising of lithium ion batteries with inverters.
15 containers (40 foot).</td></tr>
<tr><td>Access tracks</td><td>External access tracks: unsealed gravel suitable for</td></tr>
</table>

Proposal element	Description
	all weather conditions. Internal access tracks: up to 50km of 6m wide unsealed gravel
Operations and maintenance buildings	Steel framed, ColorBond finish ~~demountable~~ buildings to accommodate: • 33kV switch gear. • Control and protection equipment. • Site office. • Staff amenities. • Warehouse.
Security fencing, lighting and CCTV	Steel security fence 2.3m high with barbed wire topping. Security system with CCTV and local flood lighting.
Construction hours	Standard daytime construction hours would be 7.00am to 6.00pm Monday to Friday and 8.00am to 1.00pm on Saturdays. The following construction, upgrading, or decommissioning activities may be undertaken outside these hours without the approval of the Secretary: • Activities that are inaudible at non-associated receivers; • Delivery of materials as requested by NSW Police Force or for safety reasons; • Emergency work to avoid the loss of life, property and/or material harm to the environment
Construction timing	12 to 18 months commencing Q3 2022.
Workforce	Construction – approximately 400 staff during peak construction (approximately 6 – 9 months). This is the maximum amount workers required, it is likely to be less. Operation – 5 full time equivalent staff.

Proposal element	Description
Operation period	Up to 30 years.
Decommissioning	The site would potentially be returned to its pre-works state. All above ground infrastructure would be removed to a depth of 500mm. The site would be rehabilitated consistent with land use requirements. All infrastructure would be removed with the exception of the substation. The site would be rehabilitated consistent with future land use requirements.
Capital investment	Estimated $430 million.

A.2 Proposal layout

The indicative infrastructure layout has been developed iteratively, in tandem with the environmental assessment and consultation with relevant government agencies, the community and other stakeholders. This process aims to avoid or minimise potential impacts wherever practicable and results in a proposal that responds appropriately to the site constraints for the Wollar Solar Farm.

The proposal site and development footprint is consistent with the EIS (NGH, 2019) and as updated in the submissions report (NGH Pty Ltd, 2020).

To inform the development of the most appropriate proposal, a Preliminary Environmental Assessment (PEA) of the proposal site was undertaken in the early planning stages to determine environmental constraints associated with the site. The PEA was used to assist with designing the solar farm layout and planning the detailed methodologies for the Environmental Impact Statement. Environmental constraints can be defined as factors which affect the 'developability' of a site and include physical, ecological, social and planning factors. A map of these constraints was prepared for the PEA (NGH Environmental, 2018). This process demonstrates how the proposal has appropriately responded to the site's constraints. With reference to the site's key constraints, the proposal assessed in this EIS has:

Biodiversity:	• Avoided most areas of good condition White Box Yellow Box Blakely's Red Gum Woodland Endangered Ecological Community (EEC). • Minimised impacts to rocky outcrops. • Minimised impacts to hollow-bearing trees.
Aboriginal heritage:	• Avoided a grinding groove within the proposal site. A 15m buffer would be applied to ensure no indirect impacts.

	• Avoided a modified tree and a possible modified tree within the proposal site. A 15m buffer would be applied to ensure no indirect impacts. • Avoided a possible cultural site within the proposal site. A 20m buffer would be applied to ensure no indirect impacts.
Waterways:	• Buffered two waterways in accordance with their classification and the "Guidelines for Riparian Corridors on Waterfront Land" to minimise impacts on hydrology and water quality. This includes a 40m buffer along each 4th order waterway.

A.3 Proposed infrastructure

The proposed Wollar Solar Farm comprises of the following key items of infrastructure:

- Up to approximately 800,000 solar panels mounted on either fixed or tracking systems, both of which are considered feasible:
    - Fixed-tilted structures in a north orientation at an angle of 32 degrees or
    - East-west horizontal tracking systems.
- Approximately 58 PCU composed of a transformer and associated control equipment to convert energy generated by the solar panels to 33kV AC energy.
- Steel mounting frames with driven or screwed pile foundations.
- An onsite 330kV substation containing two transformers and associated switchgear to facilitate connection to the national electricity grid via the existing 330kV transmission line onsite.
- Underground power cabling to connect solar panels, string inverters and PCUs.
- Underground auxiliary cabling for power supplies, data services and communications.
- Buildings to accommodate a site office, 33kV switchgear, protection and control facilities, maintenance facilities and staff amenities.
- Up to 1km of access track off Barigan Road to the site via the existing TransGrid substation access road, which would require construction of an access road between the Wollar substation and the proposed onsite substation.
- Internal access tracks for construction, operation and maintenance activities.
- An energy storage facility with a capacity of up to 30 MWh (i.e. 30 MW power output for one hour) and comprising of lithium ion batteries with inverters.
- Perimeter security fencing up to 2.3m high.
- Native vegetation planting to provide visual screening for specific receivers, if any are required.

During the construction phase, temporary ancillary facilities would be established on the site and may include:

- Laydown areas.

- Construction site offices and amenities.
- Car and bus parking areas for construction staff.

A.3.1 Solar arrays

The solar arrays would consist of PV solar panels that would be grouped into arrays. Fixed and tracking systems are both considered feasible and would include the following:

1. Fixed tilted array: solar panels would be configured in a north facing orientation and at an angle of 32 degrees; or
2. East-west horizontal tracking systems: solar panels would be mounted on single axis trackers that would track sun from east-west (approximately 13,000 tracking units would be installed).

It is anticipated up to approximately 800,000 solar panels would be installed with the capacity to generate up to 290MW (AC). The individual solar panel dimensions would measure approximately 2.3m x 1.2m, providing a surface area of 2.6m^2 per solar panel.

The solar arrays would be 5m high at most (reflecting the taller tracking option) with a row spacing of approximately 7.5m. The solar arrays would be installed on steel piles that are driven or screwed into the ground at a depth of approximately 2 - 3m.

Excluding mounts, the array would be installed not less than 0.5m in height at its lowest point noting, as per the hydrological assessment recommendations:

- For fixed solar panel modules, the mounting height of the module frames would be designed such that the lower edge of the frame is clear of the predicted 1% AEP flood level plus 500mm freeboard so as not to impact on existing flood behaviour and to prevent the infrastructure from being damaged from flooding.
- For solar tracking modules, the tracking axis would be located above the 1% AEP flood level plus 500mm freeboard, and the modules rotated to the horizontal during significant flood events to provide maximum clearance to the predicted flood level.
- Where located in the floodplain the solar array mounting piers would be designed to withstand the forces of floodwater (including any potential debris loading) up to the 1% AEP flood event, giving regard to the depth and velocity of floodwaters.

Detailed design, availability and commercial considerations at the time of construction would inform the final quantity of solar panels and layout configuration.

Figure A-1 Typical proposal site

Figure A-2 Typical fixed tilted system.

Figure A-3 Typical single-axis tracking system.

A.3.2 Power Conversion Units (PCUs)

Detailed design has adopted distributed inverters as per section A.3.3. This amendment removes the need for inverters within the PCU. Array blocks consisting of approximately 12,000 solar panels would be connected to a PCU (Figure A-4). Each array block would each generate approximately 5MW (AC). This would allow for approximately 58 PCUs that would convert low voltage energy to 33kV AC energy. Each PCU consists of, a transformer and associated control equipment. The PCUs may be housed in a container measuring up to 10m long, 4m high and 3m wide (Figure A-5). The containers would be mounted on concrete footings or piles to raise them above potential flood levels.

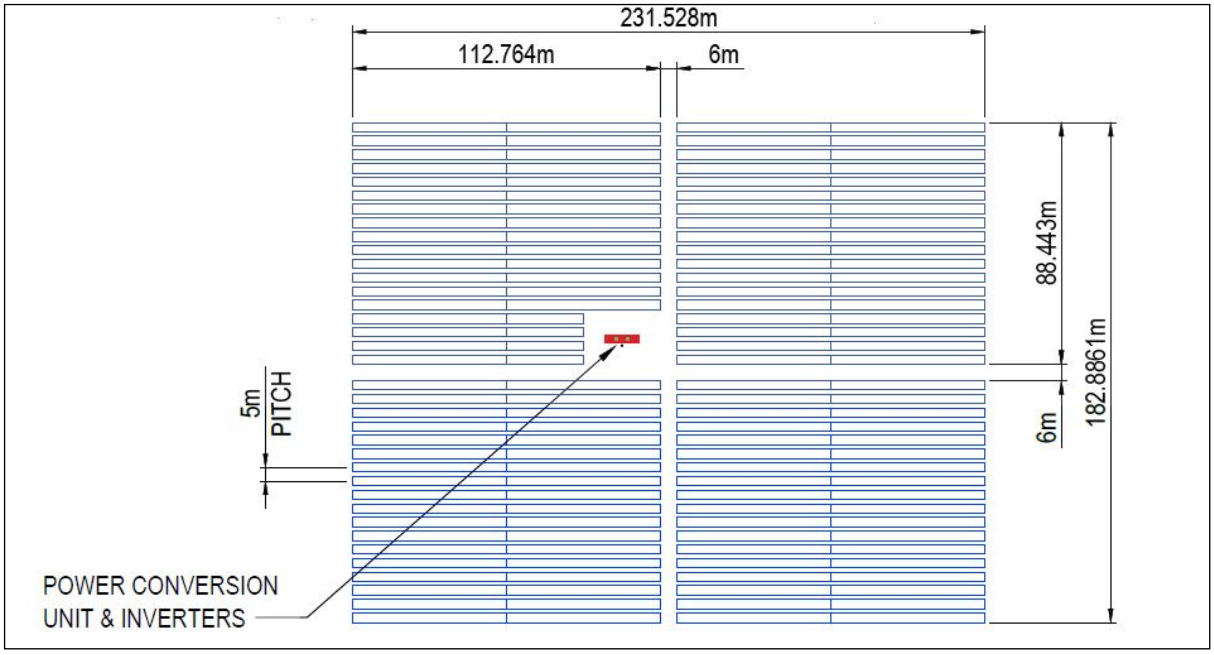

Figure A-4 Typical array block showing location of PCU.

Figure A-5 Typical illustration of a PCU within the array.

A.3.3 Distributed Inverters

During the detailed design phase of the solar farm, the decision was made to utilise distributed inverters rather than centralising it in the PCU.

Inverters would be installed at the end of each row of solar cells with the AC output being connected to transformers located within the middle of each array block. The inverters would be housed in weather proof containers approximately 1.0 x 0.6 x 0.3m in size. With this arrangement, the PCU would be replaced with a similar cabinet which would contain only a transformer and certain control and protection equipment.

A.3.4 Transmission network connection

The proposal site is traversed by a TransGrid owned and operated 330kV transmission line (Figure A7) that connects to the Wollar 500/330kV substation (Figure A-6). The Wollar substation, located approximately 1km to the east of the site, connects to the Wellington 330/132kV substation. The solar farm would connect to the national grid via a new substation constructed in the north-east corner of the proposal site. TransGrid would maintain and operate the proposed new substation to be constructed onsite for connection of the solar farm to the national grid by diverting the existing 330kV transmission line to the new substation.

Two transformers would be used to transform the 33kV energy from the PCUs to 330kV in order to connect to the national grid. The transformers would be oil-fill, with waterproof bunds and other containment measures to ensure that in the event of an oil leakage, the oil is contained and cannot leak into the surrounding environment. The transformers would be located close to the connection

point and would be approximately 470m from the nearest waterway (an ephemeral tributary of Spring Flat Creek).

Figure A-6 Wollar 500/330kV substation.

Figure A-7 330kV transmission line within 60m easement traversing the proposal site and connecting to the Wollar substation.

A.3.5 Underground cabling

Underground cabling on the site would be designed in accordance with Australian and International standards and the cable routes would be designed to minimise ground disturbance. Underground cabling would be required for:

- Connection of solar panels via a DC cable to a PCU.
- Connection of approximately 5 – 10 PCUs into a grouping.
- Connection of PCU grouping to the 33kV switchboard via a single 33kV feeder cable.
- Provision of auxiliary power, data services and communication facilities.

The cables would be installed in trenches approximately 900mm deep and the cables may be protected by conduits. A marking tape would be provided to reduce the possibility of accidental damage and ground markers would be provided to identify the cable routes.

Copper conductors would be used wherever necessary to electrically bond the metal structures to earth to protect personnel and equipment in the event of lightning strikes and electrical faults.

A.3.6 Ancillary infrastructure

Onsite substation

There would be one substation constructed within the proposal site.

The onsite 330kV substation would contain two transformers, three or four 330kV circuit breakers, current transformers and high voltage conductors to facilitate connection to the national electricity grid. The substation would be outdoors and built in accordance with Australian and TransGrid standards.

Site buildings and water infrastructure

One or more buildings would be constructed to accommodate the following:

- Control and protection equipment.
- Staff amenities including kitchen and bathroom.
- Workshop and storage facilities.
- Water tanks.
- Wastewater system.
- 33kV switchgear.

A.3.7 Site access and internal tracks

Three vehicular access points to the solar farm are proposed and discussed in detail below.

Northern access

Northern access is proposed along the existing TransGrid Wollar substation access road via Barigan Road. The TransGrid access road is 1km in length and incorporates a concrete causeway to cross Wollar Creek. No upgrade to this portion of the road is proposed.

Construction of an access road would be required between the Wollar substation and the proposed onsite substation.

The Northern Access would be used during construction and operation and would be suitable for all vehicles including heavy and oversized vehicles.

Figure A-8 Existing TransGrid access to Wollar substation

Figure A-9 Wollar Creek causeway along existing TransGrid access (left) and 330kV TransGrid transmission line between Wollar substation and proposed new substation location (right)

Southern access 1

Access to the solar farm during operation would be off Barigan Road via Maree Road and an unnamed track. Maree Road is approximately 7km along Barigan Road, both of which are owned by Mid-Western Regional Council. The unnamed track is partially located within Lot 46 DP755430 (owned by Peabody Australia Pty Ltd) and the proposal site. The unnamed track currently provides access to the residence and farm.

The Southern Access would be used during construction and operation and would likely be limited to the use of light vehicles. As such, road upgrades to this access route would not be required as the estimated number of light vehicles that would utilise the track is low and would not exceed the capacity of the road.

Should the southern access be necessary for use by heavy vehicles, upgrades would be required to Maree Road and Barigan Road. Additional assessment and approval would be needed in this case.

Southern access option 2

In the event that Northern Access cannot be used for site access, a second southern access option would be used. If required, Southern Access Option 2 would allow heavy vehicle construction access via Barigan Road and the (Maree Road) road reserve. Southern Access Option 2 would only be used if Option 1 could not be used. Approximately 1.8km of heavy vehicle access for the Northern access would not be developed in this case. The inclusion of this alternative access option would increase the development footprint by up to 2ha, to a total of approximately 463 hectares.

It should be noted that the development footprint has now been reduced surrounding the current Maree Road alignment to include a 12m corridor.

Figure A-10 Existing access to proposal site along Maree Road (left); Existing access to Maree Road via Barigan Road (right).

Internal access

Internal access tracks would be constructed to each PCU and to the substation for use during the construction of the proposal and to facilitate ongoing maintenance. The tracks would be up to 6m wide and constructed in accordance with the AustRoad requirement.

The internal roads would be approximately 6m wide to facilitate transport, unloading and mounting of the PCUs. The actual locations of the roads would be determined during the detailed design phase of the solar farm.

Internal access tracks would require up to two waterway crossings associated with Spring Flat Creek. Erosion and waterway protection would be ensured by designing waterway crossings in accordance with the following:

- *Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge, 2003).*
- *Policy and Guidelines for Fish Friendly Waterway Crossings (NSW DPI, 2003).*
- *Guidelines for Watercourse Crossings on Waterfront Land (NSW DPI, 2012).*

A.3.8 Energy storage

Solar farms are a renewable source of energy, but they do not operate continuously. The extensive use of such energy sources can lead to problems on the supply network as the available generation capacity can sometimes be inadequate to meet the demand. This issue can be mitigated by installing energy storage systems to store energy during periods of excess generating capacity. Where there are shortfalls in capacity, this stored energy can then be used to even out the load. Additionally, these storage facilities may be used to provide ancillary services to the grid.

The proposed Wollar Solar Farm would include an energy storage facility with a capacity of up to 3 0 MWh (i.e. 30 MW power output for one hour) consisting of approximately 15 containers (40 foot). The energy storage infrastructure would be installed once the solar farm is in operation and would consist of power packs comprising of lithium ion batteries with inverters (Figure A-11). They would be installed in one location near the substation, and not distributed through the site. The exact location of the future energy storage would be determined during detailed design.

Figure A-11 Typical battery storage units, located together.

A.3.9 Security and fencing

The following security measures would be established within the proposal site:

- The infrastructure on the site would be enclosed by a 2.3m high chain wire fence with barbed wire strands. This fence would be constructed early in the construction phase.
- The 330kV substation would be enclosed by a security fence in accordance with TransGrid requirements.
- An electronic security system would be established prior to commissioning of the solar farm.
- Security lighting would be installed around the entrance gates and main building areas.

A.3.10 Temporary construction facilities

Temporary facilities would be located within the site boundary during the construction phase and would include:

- Material laydown areas.
- Temporary construction site offices.
- Temporary car and bus parking for construction worker's transportation. When the construction work is completed, a small car park would be retained for maintenance staff and occasional visitors.

- Temporary staff amenities.

The staff amenities would be designed to cater for the peak number of construction staff expected to be onsite and would include:

- Sanitary modules with water flush systems connected to holding tanks. The tanks would be fitted with high level alarms and they would be pumped out regularly.
- Water tanks.
- Changing rooms.
- Lunch rooms.
- Administrative offices.
- Covered walkways.
- Emergency muster point.
- Generator – if required.
- Electrical, data and water reticulation.

A steel or concrete water storage tank would be installed near the entrance to the site for firefighting and other non-potable water uses. Rainwater tanks to be installed beside the site buildings for staff amenities. Suitable fire extinguishers would be maintained at site buildings.

A.4 Preconstruction works

The proposed Wollar Solar Farm may include works prior to construction including upgrade of construction site access road, installation of fencing, artefact salvage, geotechnical drilling and / or surveying and preparation of construction compounds and site facilities.

A.5 Construction

A.5.1 Construction activities

Construction is anticipated to take approximately 12 – 18 months. The main construction activities would include:

- Geotechnical investigations and survey.
- Site establishment: site office, staff amenities, parking, fencing, laydown areas, access road and tracks.
- Earthworks.
- Installation of drainage.
- Installation of footings: steel post foundations for solar panels and concrete foundations for buildings and equipment.
- Installation of cabling: trenching and backfilling.
- Installation of solar panels and associated frames.
- Construction of buildings.
- Installation of PCUs.

- Installation of high voltage equipment, switchboards.
- Cable termination.
- Testing and commissioning.
- Removal of construction facilities and rehabilitation.

A.5.2 Site preparation and earthworks

Soils within the development envelope have been heavily disturbed by farming activities. Gr ound disturbance resulting from earthworks associated with the proposal would be minimal and limited to:

- The installation of piles supporting the solar panels which would be driven or screwed into the ground.
- Establishment of external access road.
- Decommissioning of dams currently within the development footprint which would involve filling the dams with soil excavated from other parts of the site.
- Removal of existing fences.
- Cleaning and levelling the ground for buildings and structures and arrays.
- Localised areas of earth works (cut and fill, grading and compacting) may be required in areas where there is sudden, significant changes in ground slope.
- Construction of internal access roads.
- Excavating cable trenches.

Topsoil under the footprint of the array area would remain in-situ during the construction of the solar farm. Topsoil salvaged from the construction of the access tracks and other works would be securely stored for use in site rehabilitation.

Where required weed treatments would be undertaken prior to earth works commencing in order to reduce the potential for spread of these species within the proposal footprint.

Impacts to soils and land capability are discussed in detail in Section 7.3.

A.5.3 Materials and resources

The main construction materials would include:

- Aggregates, road base and concrete.
- Fencing materials.
- Steel footings and frames to support the solar arrays.
- Cables, conduits, junction boxes.
- Steel framing and ColorBond sheeting for permanent buildings.
- Timber and fixtures for building fit-out.

Estimated quantities of required resources are shown in Table A-2 and would be confirmed during the detailed design stage.

Table A-2 Estimated resources required.

Resource	Estimated Quantity
Gravel (access tracks)	90,400m^3
Sand (bedding for cables)	10,800m^3
Concrete (PCU and buildings)	500m^3
Estimated number of solar panels	Up to 800,000

Water requirements

Non-potable water requirements are anticipated to be an upper limit of 600kL/day and total 150ML to 180ML for the construction phase in its entirety. Potable water requirements are anticipated to be approximately 0.5ML during the construction phase. Detailed water requirements would be determined by EPC contractors.

Non-potable water would likely be sourced from rain water tanks and a local water holder and potable water would be sourced from a commercial potable water supplier. Water sources would be subject to determination by EPC contractors.

Labour, machinery and equipment

It is anticipated that up to 400 construction staff comprising of supervisors, tradesmen and labourers would be engaged to complete the work during the peak construction phase (6 – 9 months). Up to 400 workers is a maximum estimation, the amount of workers required for proposal would likely be less. Every effort would be made to hire staff locally.

Staff would be accommodated in Mudgee or nearby surrounding areas.

Plant to be used during construction would include:

- Small pile driving rig.
- Crane.
- Drum roller.
- Padfoot roller.
- Wheeled loader.
- Dump truck.
- 30t excavator.
- Grader.
- Chain trencher.
- Water truck.
- Telehandler.
- Forklift.

A.5.4 Transport and access

Road transport is the preferred option for delivery of construction infrastructure as opposed to rail transport options.

It is expected that the haulage route for most vehicles, including heavy and dimensional vehicles, during construction would be from Mudgee then north to the site via Castlereagh Highway, Wollar Road and Barigan Road. It is expected that the equipment would be transported from port facilities in either Sydney or Newcastle and delivered to the site in 12m shipping containers. The larger transformers would likely be delivered by low loaders on up to four occasions.

Materials would generally be transported to the site on heavy vehicles up to B-double and would include, but not limited to the following:

- PV solar panels.
- Piles, mounting structures and frameworks.
- Electrical equipment and infrastructure including cabling, auxiliary electrical equipment and machinery, inverters, switchgear, and the onsite substation (and transformer).
- Construction and permanent buildings and associated infrastructure.
- Earthworks, grading and lifting machinery and equipment.

Two access points are proposed for site access, the Northern Access being most suitable for larger heavier vehicles and the Southern Access being limited to access by light vehicles only.

Specialist oversize equipment including the two grid connection transformers and 200 Tonne cranes would require oversized vehicles to transport them to the proposal site. This equipment would have 'Oversize' transport management in place to transport these items to site.

All over-dimensional and AV/B-Double vehicles associated with the development must travel to and from the site via:

(a) Golden Highway, Ulan Road, Ulan-Wollar Road, Barigan Street, Maitland Street, Wollar Road and Barigan Road; and/or

(b) Castlereagh Highway, Ulan Road, Ulan-Wollar Road, Barigan Street, Maitland Street, Wollar Road and Barigan Road; and/or

However, if over-dimensional vehicles are restricted from using the above routes owing to the load rating of any bridge, then two over-dimensional vehicles may travel to site via the routes stated above or via Golden Highway, Castlereagh Highway, Old Mill Road, Rouse Street, Station Street, Cope Road, Robinson Street, MacKay Street, Main Street, Ulan Road, Ulan-Wollar Road, Barigan Street, Maitland Street, Wollar Road and Barigan Road or any other route approved via a permit granted by the National Heavy Vehicle Regulator under the Heavy Vehicle National Law (NSW).

A Construction Traffic Management Plan would be prepared following project approval to manage haulage traffic during the construction phase.

Intersection upgrades

It is expected that some upgrade of Barigan Road would be required to facilitate safe transport requirements. Intersection upgrades are not anticipated to be required for this proposal.

Traffic movements

Estimated total and maximum daily traffic movements during construction and peak construction are shown in Table A-3, and detailed traffic volumes and requirements are shown in

Table A-3 Estimated Construction traffic volumes and requirements for the Wollar Solar Farm

Type of vehicle	Estimated Vehicles over construction duration	Estimated peak maximum daily number of trips (one way)
Heavy vehicles	3659	72
Oversized vehicles	44	2
Water tankers	7920	15
Buses	7296	40
Cars	8880	60
Total	**27,799**	**189**

Table A-4 Estimated detailed traffic volumes and requirements

Item	Type of vehicle	Estimated number of vehicles during construction
Equipment		
Solar Panels	B Double	736
PCU's	Semi-Trailer or B Double	118
Switchboards	Semi-Trailer or B Double	2
Transformer and 200 Tonne Crane	Oversize vehicles	2
Total cables	Semi-Trailer or B Double	130
30 MWh battery storage	Semi-Trailer or B Double	30
Auxiliary electrical equipment and machinery	Oversize vehicles	2
Steel posts, tables and brackets	Semi-Trailer or B Double	590
Septic Tanks	Oversize vehicles	2

Item	Type of vehicle	Estimated number of vehicles during construction
Ablution and first aid	Oversize vehicle	3
Offices and Buildings	Oversize vehicles	19
Water tanks	Semi-Trailer	4
Fences		
Posts and wire mesh	Semi-Trailer or B Double	5
Earthworks, bulldozers and heavy machinery	Oversize vehicles	16
Telehandler	Semi-Trailer	30
Miscellaneous trucks	Standard truck, semi-trailer or B Double	2000
Water Tankers	20000L Tanker	7920
Construction personnel		
Construction workers	Shuttle buses	7296
	Cars	8880

During peak construction, it is anticipated that up to 400 site personnel would be required to undertake the works. A shuttle bus system would likely be implemented to transport personnel to the site on 25 seater buses. This would generate up to 20 vehicle movements to the site and 20 vehicle movements from the site, equating to 40 daily vehicle movements. Additionally, extra allowance has been made for up to 60 daily light vehicle movements for workers to access the site.

It is expected that up to four one-way movements of oversized vehicles would be required for transport of the transformer and 200 Tonne cranes.

A.5.5 Hours of operation during construction

During the construction phase of the solar farm, work would be undertaken during the following hours:

- Monday – Friday: 7am – 6pm
- Saturday: 8am – 1pm

The following construction, upgrading, or decommissioning activities may be undertaken outside these hours without the approval of the Secretary:

- Activities that are inaudible at non-associated receivers;
- Delivery of materials as requested by NSW Police Force or for safety reasons;
- Emergency work to avoid the loss of life, property and/or material harm to the environment

A.6 Operation

A.6.1 Activities during operation

The solar farm would be in operation continuously. The solar farm would only generate electricity during sunlight hours but the energy storage system could be activated at any time.

The solar farm would operate automatically but there would be provision to both locally and remotely monitor the performance of the equipment and to activate the energy storage system.

Activities undertaken during operation would include:

- Solar panel maintenance.
- Monitoring the performance of the solar farm.
- Inspection of the installation.
- Routine preventative maintenance.
- Emergency repair response (24 hours).
- Site security response (24 hours).
- Vegetation management within the development footprint in accordance with the fire management and biodiversity management plans.

A.6.2 Water requirements

Cleaning materials and spare parts would be made available on site for use by the maintenance staff. Panel cleaning may be required during drought conditions. As such, additional panel cleaning may also be required on occasion. As a ‘worst case’ upper limit, it is estimated that up to 700kL of water would be required per year.

It is estimated that up to 21.7ML would be required per year and if insufficient water is collected on site from rain water tanks and dams, water would be obtained commercially.

A.6.3 Transport and access

The travel demand during the operation phase of the proposal is anticipated to be significantly less than the construction phase. It is estimated that the daily peak travel demand during operation would be approximately 8 vehicles movements a day. At least 2 over-dimensional vehicle movements to upgrade the Solar Farm as required during its operational life may be required.

A.6.4 Personnel and work hours

A total of five equivalent full time staff would be employed onsite when the solar farm is operational. Associated work would be undertaken during the standard working hours of:

- Monday – Friday: 7am - 6pm
- Saturday: 8am – 1pm

Work would only be undertaken outside of these hours in an emergency and would be kept to a minimum.

During the life of the solar farm, it may be necessary to engage contract staff to undertake specific major tasks at which time there could be greater numbers of people onsite. Such work would most likely relate to the replacement/refurbishment of the energy storage system, as it is assumed that the batteries would have to be replaced at least once during the life of the solar farm.

It is anticipated that the staff would drive light vehicles to the site each working day.

As noted in Section A.3.3, TransGrid would be responsible for the operation and maintenance of the 330kV substation and TransGrid staff would require access to that part of the site.

The TransGrid owned Wollar Substation is less than 1km from the proposal site so it is expected that the maintenance of the two sites would be coordinated and, in respect of TransGrid staff, the presence of the new substation would have minimal impact on traffic in the area.

The standard working hours for TransGrid staff are:

- Monday – Friday: 7am – 6pm

A.6.5 Lighting and CCTV

Under normal circumstances, there would be no night lighting located on site.

External lighting would be provided around the buildings, and in the high voltage substation but they would only be used on the rare occasions that staff are working on the site during the hours of darkness.

There may be some security lighting at critical locations around the perimeter of the site, but these would only be activated when the automatic security system senses an unauthorised site entry. Task lighting would be provided at PCU's.

CCTV security cameras would be located at the entrance gate and around the substation and battery storage, and O&M facilities and office areas.

A.6.6 Refurbishment and upgrading

It is estimated that the solar equipment would have a life of 30 years and the benefits of refurbishing the equipment would be considered as this time draws near.

It is anticipated that the batteries that would be used in energy storage system would have a life of 15 years, it is anticipated that they would need to be replaced at least once during the life of the solar farm.

A.7 Decommissioning and rehabilitation

The expected life of the proposed Wollar Solar Farm is 30 years with the exception of the energy storage equipment which, because of the battery technology, is expected to have a life of

approximately 15 years. It is anticipated that after 15 years the batteries would be replaced. Similarly, after 30 years, other solar farm infrastructure may be refurbished to continue operations.

When the solar farm is no longer viable, all above ground infrastructure, with the possible exception of the 330kV substation, would be removed and decommissioning and rehabilitation of the site would commence. It is noted that the 330kV substation would at that time form part of TransGrid's transmission link between Wollar and Wellington. Other works would need to be carried out to re-establish the link if the substation were to be removed.

The solar arrays would be removed and the steel piles on which they are supported, would be removed. Both the steel piles and the solar panels would be recycled, where possible.

All buildings would be removed, including the PCUs together with the associated footings.

Cabling would be removed where practical and recycled. Any cabling greater than 500mm below the ground may be left in place since this would not impact on future agricultural activities on the site once the restoration is complete.

The objective of this stage is to return the site to its existing land capability, for continued agricultural or other compatible land use options.

At least 14 over-dimensional vehicle movements would be required during the decommissioning of the Solar Farm and Substation.

A.8 Indicative timeline

Table A-5 Indicative timeline

Phase	Approximate commencement	Approximate duration
Construction	Q3 2022	12 - 18 months
Operation	Q4 2023	30 years
Decommissioning	2054	9 months